What is the acceptance of video consultations among orthopedic and trauma outpatients? A multi-center survey in 780 outpatients

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Abstract: INTRODUCTION The purpose of the present study was to assess orthopedic and orthopedic trauma patients' willingness to perform hypothetical remote video consultations, possible advantages as well as concerns. METHODS Between June 2019 and November 2019, a survey amongst consecutive regular orthopedic and orthopedic trauma patients at the outpatient clinics from three European level I trauma centers was conducted via paper-based questionnaires, composed of participants' demographics as well as five open and closed questions. Participation was voluntary and anonymity was granted. RESULTS In total, 780 participants (female 302, 38.7%, male 478, 61.3%) with a mean age of 43.8 years (SD 17.1, range from 14 years to 94 years) were included. The majority of the participants (57,6%) were eager to use a remote consultation. Participants with an age of more than 55 years were significantly less likely to use a remote consultation than their younger counterparts (OR= 0.18, p=0.003. r^2=0.141). Among the whole study population, 86.2% stated, that they had a device compatible with an online video consultation. The highest willingness to conduct a video consultation in respect of the participants' occupation was observed in "part-time"-jobs (70.6%), whereas the lowest disposition was seen in retired patients (37.1%) (p= 0.0001). The most stated reason why to conduct a video consultation was "communication of medical findings" (67.8%). The most stated advantage was the "reduction of physical consultations" (66.4%). "No physical examination" was the most frequently stated disadvantage (75.9%). CONCLUSION The majority of orthopedic and orthopedic trauma outpatients would use a video consultation, especially because of commuting and time issues and ideally to communicate medical findings, such as x-ray reports or lab values. Elderly patients appear to be less eager in regard to video consultations. These results may change for even better acceptance in view of a current pandemic situation, as experienced since early 2020. We feel that this assumption may warrant further investigation.

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What is the acceptance of video consultations among orthopedic and trauma outpatients? A multi-center survey in 780 outpatients

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ABSTRACT

Introduction: The purpose of the present study was to assess orthopedic and orthopedic trauma patients' willingness to perform hypothetical remote video consultations, possible advantages as well as concerns.

Methods: Between June 2019 and November 2019, a survey amongst consecutive regular orthopedic and orthopedic trauma patients at the outpatient clinics from three European level I trauma centers was conducted via paper-based questionnaires, composed of participants' demographics as well as five open and closed questions. Participation was voluntary and anonymity was granted.

Results: In total, 780 participants (female 302, 38.7%, male 478, 61.3%) with a mean age of 43.8 years (SD 17.1, range from 14 years to 94 years) were included. The majority of the participants (57,6%) were eager to use a remote consultation. Participants with an age of more than 55 years were significantly less likely to use a remote consultation than their younger counterparts (OR= 0.18, p=0.003. r^2=0.141). Among the whole study population, 86.2% stated, that they had a device compatible with an online video consultation. The highest willingness to conduct a video consultation in respect of the participants' occupation was observed in "part-time"-jobs (70.6%), whereas the lowest disposition was seen in retired patients (37.1%) (p= 0.0001). The most stated reason why to conduct a video consultation was "communication of medical findings" (67.8%). The most stated advantage was the "reduction of physical consultations" (66.4%). "No physical examination" was the most frequently stated disadvantage (75.9%).

Conclusion: The majority of orthopedic and orthopedic trauma outpatients would use a video consultation, especially because of commuting and time issues and ideally to communicate medical findings, such as x-ray reports or lab values. Elderly patients appear to be less eager in regard to video consultations. These results may change for even better acceptance in view of a current pandemic situation, as experienced since early 2020. We feel that this assumption may warrant further investigation.

Introduction

The digital development in medicine is inevitably on the rise and may alter interactions between physicians and their patients. The WHO stresses the importance of using new technologies in order to make use of the full potential for information and communication [1]. Due to the high acceptance rate towards the use of digitalization, the medical community has to make more use of the available resources and/ or develop new strategies to use digital technologies in treating patients, especially in global burdens like the COVD-19 crisis. Worldwide, more and more elderly people are using smartphones. A study revealed, that 53 % of the over 65 year old people in the US own a smartphone, compared to the European Union, where 23% of people older than 64 years of age used a smartphone in 2016 [2,3]. In Germany, the smartphone usage in the group of the elderly seems to be higher compared to the

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overall usage in the European union. In 2019, 40% of people aged 65 years or older used a smartphone on a regular basis [4].

In a study conducted amongst 1604 smartphone users in the U.S,.58% of participants had downloaded a health-related app in 2015 [5]. The right use of eHealth can be advantageous for both, the patient and the treating physician. The options are manifold, such as reduction in travel distance, waiting time and duration of consultation. In addition, health related costs can be lowered, and eHealth-systems can be easily used as follow-up instruments, which could decrease the common loss of follow-up in orthopedic trauma patients [6,7]. A study among US orthopedic surgeons assessed that the implementation of eHealth into the orthopedic follow-up process would be welcomed by 60% of the assessed surgeons [8]. Video consultations are already in use and show general acceptance in patients and treating physicians in different medical disciplines [9]. Online video consultations could be particularly used in traumatology and orthopedics for the judgement of wounds, visiting of patients currently undergoing rehabilitation, postoperative range of motion assessment and private doctor-patient related discussions [10]. However, little is known, if patients who are currently in trauma or orthopedic treatment, would accept and make use of a video consultation.

Thus, the aim of this study was to conduct a survey investigating the willingness of individuals who were currently treated by a trauma orthopedic trauma surgeon, to use live video consultation. The study also investigated patients' concerns and appreciation about the mentioned hypothetical use of remote consultation.

Materials and methods

Patients and survey design

A standardized questionnaire was handed out to patients in the outpatient clinics of the authors' trauma and orthopedic departments in Switzerland and Germany. The survey was conducted between June 2019 to November 2019. The only inclusion criteria was being currently treated by an orthopedic or a trauma surgeon at one of those three institutions. Participation was voluntary and anonymity was granted. All participants received a written patient information explaining the aim of the study and processing of their data. No identifying data except for age, gender and occupation was collected. Hence, data can be assumed to be anonymous and the European data protection regulations do not apply. In addition, the local ethics committees of all participating centers have declared general waivers for surveys with anonymous data. By answering the questionnaire, participants gave consent to the use of the data that they had provided.

Study questionnaire

The questionnaire first explained the general process and the technical requirements for a successful hypothetical online video consultation. Furthermore, it was explained, that health insurances cover online video consultation at no additional costs. Additionally, the online video consultation would always be live, using certified and secured connections via notebook, smartphone, desktop computer or tablet. In the following, the participants' baseline characteristics including age, sex and professional status (part-time, "9-to-5" (office hours, 9am to 5pm), self-employed, shiftwork, others (student, not willing to give information about the occupational status, jobless) and "retired") were obtained. They were then asked, if they would use a video consultation in general and if they have the equipment for conducting a video consultation (yes, no, uncertain). In further three questions, patients were asked for what special reason they would use it and what advantages and disadvantages they see in a video consultation by choosing from a number of answers provided, including optional free text comments.

Statistical analysis

Further statistical analysis was done by the use of SPSS for Mac 25.0 (SPSS, Chicago, Illinois, USA). Data is presented as frequencies (n) and means with the standard deviation (SD). To assess differences between groups, a Chi-Square test was used for categorical data. A subgroup analysis was performed for age (group 1: $<$ 30 years, group 2: 30 to 55 years, group 3: $>$ 55 years, arbitrary selection of thresholds), gender and profession. The level of statistical significance was set at $p < 0.05$.

Age (categorized), sex, and profession were assessed in a binary logistic regression as predictors for the use of a video consultation (yes or no).

Results

Demographics

In total, 780 participants (female 302, 38.7%, male 478, 61.3%) with a mean age of 43.8 years (SD 17.1, range from 14 years to 94 years) were included. The group with patients up to 30 years of age counted 220 participants (35.5%) (group 1), whereas the group between 30 and 55 years of age consisted of 356 participants (45.6%) (group 2) and the patients older than 55 years counted 204 participants (26.2%) (group 3). [Table 1] Most of the participants were "9-to-5"-workers (32.9%) followed by "others" (22.8%), "retired" (16.3%), shift workers (16.3%), "part-time" (6.5%) and "self-employed" (4.5%).

Question 1: *Could you generally imagine using a video consultation?*

The majority of the study population would be willing to use a video consultation (57.6%), 21.2% were unsure and 21.3% would not. There was no significant difference between the assessed cities the study was conducted in. Males were significantly more likely to use a video consultation (61.3%) than female participants (51.7%) (p=0.027). The highest rate of willingness to conduct an online consultation was observed in age group 2 (64.3%), followed by group 1 (60.5%) and group 3 (42.6%). [Table 2] ($p<0.0001$).

The highest rate in favour for the video consultation in respect of the participants' occupation was observed in part-time (70.6%) followed by "9-to-5" (66.5%), self-employed (65.7%), shift work (59.1%), "others" (53.4%) and retired (37.1%) (p=0.0001).

Table 1
Distribution of participants by gender and age.

Age	n	Gender Male	Female
all ages	780	478 (61,3%)	302 (38,7%)
</= 30	220	150 (68,2%)	70 (31,8%)
>30 - </= 55	356	231 (64,9%)	125 (35,1%)
>55	204	97 (47,5%)	107 (52,5%)

Table 2
Could you generally imagine using a video consultation?

	N	YES	NO	UNCERTAIN
All ages	780	449 (57.6%)	166 (21.3%)	165 (21.2%)
≤ 30y	220	133 (60.5%)	35 (15.9%)	52 (23.6%)
>30y - ≤ 55y	356	229 (64.3%)	61 (17.1%)	66 (18.6%)
> 55y	204	87 (42.6%)	70 (34.3%)	47 (23.1%)
Male	478	293 (61.3%)	91 (19.0%)	94 (19.7%)
Female	302	156 (51.7%)	75 (24.8%)	71 (23.5%)

Table 3
For what specific situation could you imagine using a video consultation?

	All ages (n=780)	≤ 30y (n=220)	> 30y - ≤ 55y (n=356)	> 55y (n=204)
Communication of medial findings*	529 (67.8%)	152 (69.1%)	269 (75.6%)	108 (52.9%)
Prescription*	517 (66.3%)	145 (65.9%)	255 (71.6%)	117 (57.4%)
Personal Question*	479 (61.4%)	138 (62.7%)	247 (69.4%)	94 (46.1%)
Referral letter*	384 (49.2%)	102 (46.4%)	194 (54.4%)	88 (43.1%)
Certificate of incapacity for work*	369 (47.3%)	121 (55.0%)	198 (55.6%)	50 (24.5%)
Stay abroad*	357 (45.8%)	109 (49.5%)	191 (53.7%)	57 (27.9%)
Follow-up*	291 (37.3%)	75 (34.1%)	156 (43.8%)	60 (29.4%)
Initial consultation in newly occurred illness	169 (21.7%)	41 (18.6%)	87 (24.4%)	41 (20.1%)

* = $p<0.05$ between age groups

Table 4
Which of the mentioned advantages do you see in a video consultation?

	All ages (n=780)	≤ 30y (n=220)	> 30y - ≤ 55y (n=356)	> 55y (n=204)
Reduction of physical consultations*	518 (66.4%)	156 (70.9%)	256 (71.9%)	106 (52.0%)
No travelling*	510 (65.4%)	159 (72.3 %)	246 (69.1%)	105 (51.1%)
Availability from anywhere*	399 (51.2%)	128 (58.2%)	200 (56.2%)	71 (34.8%)
No danger of infection*	346 (44.4%)	94 (42.7%)	183 (51.4%)	69 (33.8%)
Availability at inconvenient times	302 (38.7%)	94 (42.7%)	143 (40.2%)	65 (31.9%)

* = $p<0.05$ between age groups

Table 5
Which of the mentioned disadvantages do you see in a video consultation?

	All ages (n=780)	≤ 30y (n=220)	> 30y - ≤ 55y (n=356)	> 55y (n=204)
No physical examination*	592 (75.9%)	181 (82.3%)	284 (79.8%)	127 (62.3%)
No incidental findings*	456 (58.5%)	142 (64.5%)	222 (62.4%)	92 (45.1%)
No direct contact with the doctor	383 (48.1%)	101 (45.9%)	172 (48.3%)	110 (53.9%)
Data security*	223 (28.6%)	73 (33.2%)	113 (31.7%)	37 (18.1%)
Relationship to the doctor could change	208 (26.7%)	53 (24.1%)	104 (29.2%)	51 (25.0%)

* = $p<0.05$ between age groups

In a multivariate regression-analysis using “would you use a video consultation?” (yes/no) as dependent variable (outcome) and the parameters “age”, “occupation”, and “gender” as independent variables, only “age” was a significant predictor for the willingness to use a video consultation. Participants with an age of more than 55 years were 5 times less likely to use a remote consultation than their younger counterparts. (r^2=0.141, OR= 0.18, CI 95%= 0.06 – 0.56, p=0.003).

Question 2: *Do you own a device suitable for a video consultation (e.g., smartphone, laptop with camera and microphone)?*

Overall, 86.2% of the participating patients stated that they had a smartphone and/or another device (laptop, tablet) with which a video consultation would be possible (camera, microphone, internet). Age group 2 showed the highest incidence of smartphones and/or other compatible devices with 94.1% followed by group 1 (93.6%) and group 3 with 64.2%. There was no significant difference between female and male participants (p=0.558).

Question 3: *For what specific situation could you imagine using the video consultation?*

The three most often stated reasons for the usage of the video consultation amongst the whole study population were “communication of medical findings” (67.8%), “prescriptions” (66.3%) and “personal questions” (61.4%). The most unlikely reason for using the online consultation was a preliminary consultation in a newly occurred disease or trauma (21.7%). [Table 3]

Question 4: *Which of the mentioned advantages do you see in the video consultation?*

The three most often stated suspected advantages of the online-video consultation were “reduction of consultations” (66.4%) followed by “contact to the doctor from home / no need of traveling” (65.4%) and “doctor is reachable from anywhere” (51.2%). [Table 4]

Question 5: *Which of the mentioned disadvantages do you see in the video consultation?*

The three most frequently stated suspected disadvantages of the online-video consultation were “no physical examination” (75,9%) followed by “no incidental findings” (58,5%) and “no personal contact to the doctor in general” (49,1%). [Table 5]

There were no additional free text comments which were not already covered by the questionnaire.

Discussion

The aim of the present study was to assess if orthopaedic trauma and orthopedic outpatients would be willing to perform a video consultation, whether they had the necessary equipment and which advantages and disadvantages they would connect with a potential consultation via the internet.

In our study population, the vast majority had a smartphone and/or device which would suit to perform a video consultation. More than half of the over 55-year old participants stated that they have the required equipment, which is a higher rate than previous studies have shown [3–4]. Our study indicated that the majority of the participants would use a remote consultation for traumatic or orthopedic health problems, which reflects a higher rate of positive responds towards the use of telemedicine than in previous studies [11,12]. The willingness to participate in a telemedical consultation decreased with age, which might be consistent with elderly people‘s reduced affinity towards the usage of electronical devices [13–16]. So called “computer anxiety” might be the most important factor for elderly people to disagree with the use of telemedicine [17]. However, although willingness might be decreasing with age, other studies have found that age does not have significant influence on patients‘ willingness to conduct telemedical consultations, or online-video consultations in particular [18,19]. In the present study, interestingly, males were significantly more likely to use a video consultation than female participants, but in multivariate re-

gression analysis, gender was not a significant predictor for the potential use of a video consultation. A survey of 1006 patients in Germany has found that gender has no influence on the willingness to undergo a video consultation [18]. In respect of the participants' occupation, our survey showed that patients with part-time and "9-to-5" jobs would rather use the video consultation than self-employed and "shift-workers". To our knowledge, there is no data on willingness to perform a video consultation in respect of participants' occupation available yet. Participants who were retired showed the smallest rate of willingness which can be seen as consistent with the decreasing rate of acceptance in elderly patients. The most often stated reasons for the use of an online consultation were communication of medical findings, prescriptions and personal questions which is in agreement with a survey conducted in the U.S. from 2019 [20]. Interestingly, the less frequently stated reason to conduct an online video consultation was a newly occurred disease. Other authors had previously promoted the video consultation as a good tool for judging newly occurred patients' problems in order to conduct a sufficient triage [21].

The three most often stated advantages of the video consultation in the presented study population were the reduction of consultations, reduction of travel and that the doctor is reachable from anywhere. This is consistent with findings of several previous studies [22–24]. Almost half of the participants stated that "no danger of an infection in the medical office" is an advantage of a video consultation. It can be assumed that in the current Covid-19 pandemic, patients would be more worried about infections and therefore would rather use a video consultation for the mentioned reason [25]. The most frequently stated disadvantages of the video consultation were that no physical examination would be possible, no incidental findings could occur and that there would be no direct contact with the treating physician in general, which is consistent with findings of various previous of other medical disciplines [26,27]. The complaint about not having physical contact with the doctor was mostly stated in the group of the elderly patients, which is in agreement with findings of earlier projects [24]. As major topic, data security is one of the biggest aspects in digital medicine [28]. However, it seems that concerns about data security are less prevalent when it comes to video consultations [19,29,30]. Also in the presented survey, only almost a third of the participants had critical thoughts about data security. To our knowledge, there is no study published, addressing solely the willingness and opinions of orthopedic and oprthopedic trauma patients towards online video consultations. It is known that patients prefer the use of video consultations in routine care [31,9,32]. However, several studies have found that minor trauma, orthopedic consultation in an out-patient setting, triage of trauma patients or follow-ups are suitable for video consultations [33–36]. In the presented study, patients were rather willing to perform a remote consultation for personal questions and prescriptions than follow-up or newly occurred trauma. A study from Norway has shown that patients' satisfaction is not impaired in video-assisted orthopedic consultations compared to standard consultations [37]. Several other studies assessed that (orthopedic) surgeons are mainly satisfied with video consultations and that the patients' outcomes treated via video consultations are comparable to those treated conventionally [38,35,39].

This study has certain limitations. It is known that surveys have minor level of evidence. The outcome is directly linked to the participant's understanding and rating of the questions. Also, due to the voluntariness of participation, patients with a critical attitude towards the topic of digitalization or video consultation might be under-represented. Furthermore, the patients in this study consulted the outpatient clinics due to already existing specific problems, which might have biased their opinion. Additionally, we did not assess the circumstances of visits of the individual participants (e.g. fracture type, follow-up, etc.), which could have biased their opinion on a video consultation and might have changed its feasibility.

We feel that our data may be helpful in projecting requirements for online consultations in the near future. Also, patients who have difficulties travelling or making time for doctors' appointments can benefit from remote consultations [40]. Further need may ensue given the current pandemic, where telemedicine may help reduce the risk of infections by prolonged exposure in waiting areas. The practical use of video consultations in diagnostics, for therapeutic or follow-up reasons, especially in orthopedics and traumatology, will have to be addressed in further studies. It may be advantageous to offer patients the opportunity to choose between physical consultations and video consultations.

Conclusion

The majority of the participants in this survey amongst orthopedic and orthopedic trauma outpatients appear to be willing to use a video consultation. Most participants would use the remote consultation for prescriptions and personal questions rather than for direct presentation of orthopedic or traumatic problems and initial diagnostics. Advantages of the video consultation according to the study participants were the reduction of physical appointments as well as the reduction of travelling. Most frequently stated disadvantages were no possible physical examination and no incidental findings. Data security was not a major concern for the participating patients. These results may be more favourable in view of the current pandemic.

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Declaration of Competing Interest

All authors certify that no conflicts of interest exist that need to be reported.

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